applied to the last result, give after simplifications,

$$\{(M+m)R^2+Mk'^2\}\ddot{\varphi}-mRr'\cos(\theta-\alpha)\ddot{\theta}+mRr'\sin(\theta-\alpha)\dot{\theta}^2=g(M+m)R\sin\alpha,$$

$$Rr'\cos(\theta-\alpha)\ddot{\varphi}-(r'^2+k''^2)\ddot{\theta}=gr'\sin\theta.$$

Eliminating $\ddot{\varphi}$,

$$[(r'^2+k''^2)\{(M+m)R^2+Mk'^2\}+mR^2r'^2\cos^2(\theta-\alpha)]\ddot{\theta}-mR^2r'^2\sin(\theta-\alpha)\cos(\theta-\alpha)\dot{\theta}^2$$
$$=-gr'[\{(M+m)R^2+Mk'^2\}\sin\theta+(M+m)R^2\sin\alpha\cos(\theta-\alpha)].$$

Multiplying by $2\dot{\theta}$ and integrating

$$[(r'^2+k''^2)\{(M+m)R^2+Mk'^2\}+mr'^2R^2\cos^2(\theta-\alpha)]\dot{\theta}^2$$
$$=gr'[2\{(M+m)R^2+Mk'^2\}\cos\theta-2(M+m)R^2\sin\alpha\sin(\theta-\alpha)]+C',$$

which is of the same general form as (7), p. 351, this MONTHLY for November, 1916.

NUMBER THEORY.

235. Proposed by W. D. CAIRNS, Oberlin College.

Prove that $n=1$ is the only positive integer for which n^4+4 is a prime.

SOLUTION BY WM. E. PATTEN, Government Institute of Technology, Shanghai, China.

$$n^4+4=(n^4+4n^2+4)-4n^2=(n^2+2)^2-(2n)^2=(n^2+2n+2)(n^2-2n+2).$$

Therefore, n^4+4 is a prime, if at all, only for those values of n which make either $n^2+2n+2=1$, or $n^2-2n+2=1$, since each of the factors of n^4+4 given above is integral in value when n is integral, and both are positive when n is positive.

(1) When $n^2+2n+2=1$, then $n=-1$.

(2) When $n^2-2n+2=1$, then $n=+1$. When $n=+1$, then $n^4+4=5$, a prime.

Therefore, n^4+4 is a prime for $n=1$, and for no other positive integral values of n.

Also solved by ELMER SCHUYLER, FRANK IRWIN, HORACE OLSON, ELIJAH SWIFT, H. H. CLARK, ELIZABETH B. DAVIS, NORMAN ANNING, L. G. WELD, and the PROPOSER.

236. Proposed by V. M. SPUNAR, Chicago, Illinois.

Find integral values of x, y, z, such that

$$xy+z=\square,\quad yz+x=\square,\quad\text{and}\quad xz+y=\square.$$

SOLUTION BY ARTEMAS MARTIN, LL.D., Washington, D. C.

Assume $x=n^2$, $y=(n+1)^2$; then the given equation becomes

$$n^2(n+1)^2+z=\square,\quad (n+1)^2z+n^2=\square,\quad n^2z+(n+1)^2=\square.$$

Put

$$n^2(n+1)^2+z=a^2.$$

Assume $a=n^2+n+b$, and the last equation becomes

$$n^2(n+1)^2+z=a^2=(n^2+n+b)^2,$$

from which we immediately find

$$z=b(2n^2+2n+b).$$

Substituting in

$$(n+1)^2z+n^2=\square,$$

we have

$$b(n+1)^2(2n^2+2n+b)+n^2=\square=c^2,$$